T02T20 E8E05860

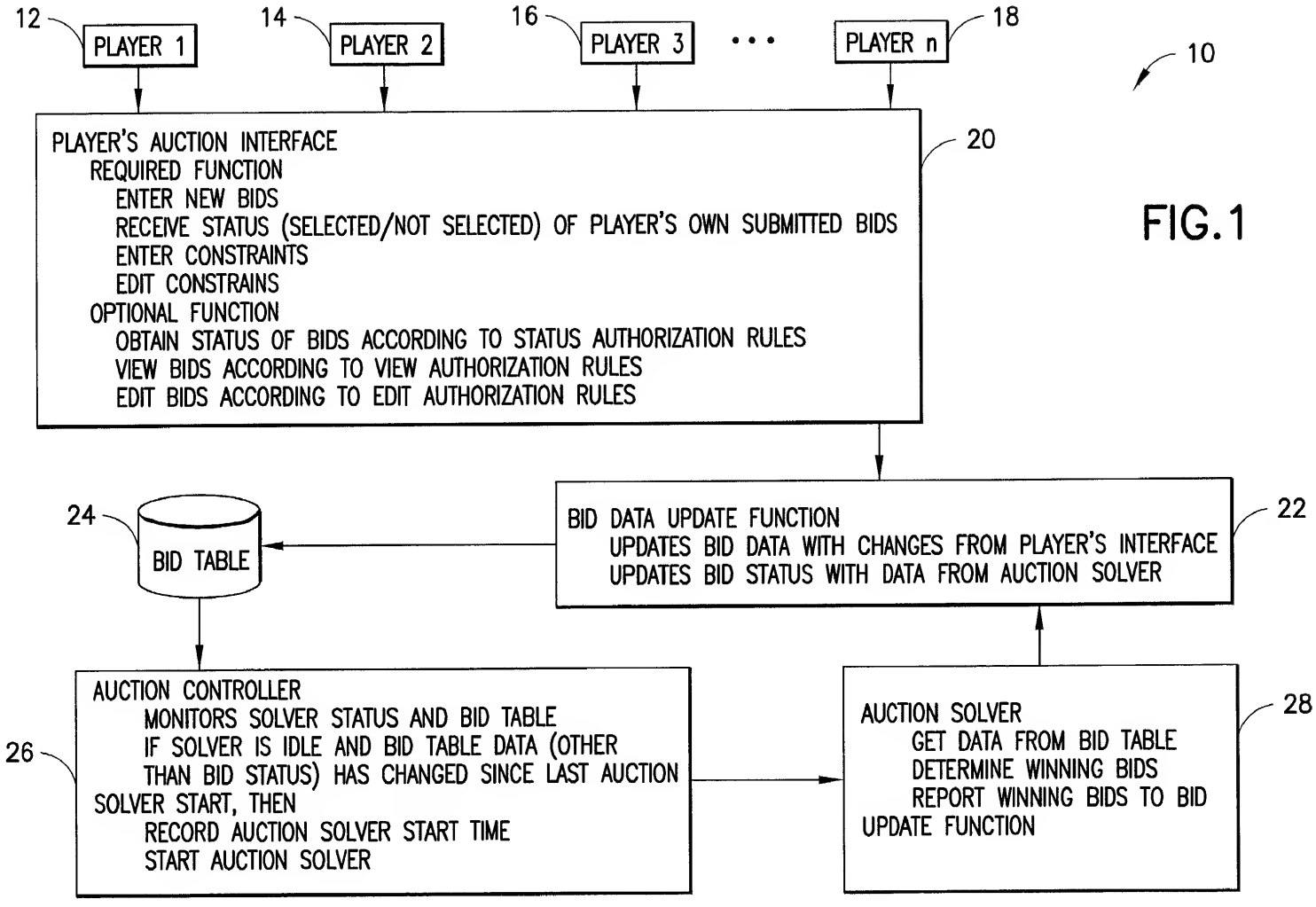

FIG.1

ADD CONSTRAINT

- BUDGET
- MIN/MAX QTY
- PRECEDENCE
- LINEAR

EDIT CONSTRAINT

ADD BID

ITEM	BID VALUE	STATUS
1	93	SELECTED
2	43	UNSELECTED
3	21	SELECTED
4	17	UNSELECTED
5	29	UNSELECTED

BASIC BID DATA

SET	BUDGET
1,2,3	120
3,4,5	50

BUDGET CONSTRAINTS

ITEM	PRECEDENCE SET
3	1
3	2, 4

PRECEDENCE CONSTRAINTS

MIN QTY	SET	MAX QTY
2	1,2,3,4	
	2,4,5	2

QUANTITY CONSTRAINTS

ITEM	COEF	COEF
1	10	10
2	10	−10
3	20	10
4	40	−10
5		10
TOTAL	60	20

LINEAR CONSTRAINTS

FIG.2a

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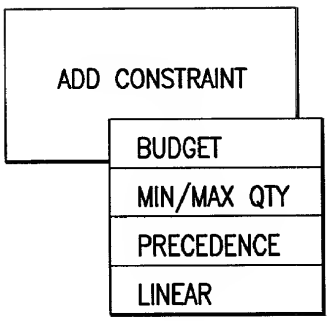

ITEM	BID VALUE	STATUS
3	43	UNSELECTED
4	29	SELECTED
5	31	SELECTED
6	12	SELECTED
7	17	UNSELECTED

BASIC BID DATA

SET	BUDGET
5,6,7	50

BUDGET CONSTRAINTS

ITEM	COEF	COEF
3	20	15
4	30	18
5	21	13
6		17
7	30	14
TOTAL	50	48

LINEAR CONSTRAINTS

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FIG.2b

$$\text{MAX } 93x_{1,1}+43x_{1,2}+21x_{1,3}+17x_{1,4}+29x_{1,5}+43x_{2,3}+29x_{2,4}+31x_{2,5}+12x_{2,6}+17x_{2,7}$$

SUBJECT TO

$$x_{3,1}+x_{3,2}\leq 1$$
$$x_{4,1}+x_{4,2}\leq 1$$
$$x_{5,1}+x_{5,2}\leq 1$$
$$93x_{1,1}+43x_{1,2}+21x_{1,3}\leq 120$$
$$21x_{1,3}+17x_{1,4}+29x_{1,5}\leq 50$$
$$x_{1,2}+x_{1,4}+x_{1,5}\leq 2$$
$$2z^{Min}_{1,1}\leq x_{1,1}+x_{1,2}+x_{1,3}+x_{1,4}$$
$$x_{1,1}\leq z^{Min}_{1,1}$$
$$x_{1,2}\leq z^{Min}_{1,1}$$
$$x_{1,3}\leq z^{Min}_{1,1}$$
$$x_{1,3}\leq z^{P}_{1,3,1}+z^{P}_{1,3,2}$$
$$z^{P}_{1,3,1}\leq x_{1,1}$$
$$2z^{P}_{1,3,2}\leq x_{1,2}+x_{1,4}$$
$$10x_{1,1}+10x_{1,2}+20x_{1,3}+40x_{1,4}\leq 60$$
$$10x_{1,1}-10x_{1,2}+10x_{1,3}-10x_{1,4}+10x_{1,5}\leq 20$$
$$31x_{2,5}+12x_{2,6}+17x_{2,7}\leq 50$$
$$20x_{2,3}+30x_{2,4}+21x_{2,5}+30x_{2,7}\leq 50$$
$$15x_{2,3}+18x_{2,4}+13x_{2,5}+17x_{2,6}+14_{2,5}\leq 48$$
$$x_{1,1},x_{1,2},x_{1,3},x_{1,4},x_{1,5}\in\{0,1\}$$
$$x_{2,3},x_{2,4},x_{2,5},x_{2,6},x_{2,7}\in\{0,1\}$$
$$z^{Min}_{1,2},z^{P}_{1,3,1},z^{P}_{1,3,2}\in\{0,1\}$$

FIG.3a (NUMERAL 34)

MAX $29y_{1,1} + 114y_{1,2} + 60y_{1,4} + 72y_{1,5} + 46y_{1,6} + 153y_{1,7} + 165y_{1,8} + 139y_{1,9} + 43y_{2,1} + 29y_{2,2} + 31y_{2,3} + 12y_{2,4} + 17y_{2,5} + 55y_{2,8} + 60y_{2,9} + 60y_{2,10} + 41y_{2,11} + 104y_{2,14} + 72y_{2,15}$

SUBJECT TO

$$y_{1,1} + y_{1,2} + y_{1,4} + y_{1,5} + y_{1,6} + y_{1,7} + y_{1,8} + y_{1,9} \leq 1$$

$$y_{2,1} + y_{2,2} + y_{2,3} + y_{2,4} + y_{2,5} + y_{2,8} + y_{2,9} + y_{2,10} + y_{2,11} + y_{2,14} + y_{2,15} \leq 1$$

$$y_{1,2} + y_{2,1} + y_{2,8} + y_{2,9} + y_{2,14} + y_{2,15} \leq 1h$$

$$y_{2,4} + y_{1,6} + y_{1,7} + y_{1,9} + y_{2,2} + y_{2,10} + y_{2,11} + y_{2,14} \leq 1$$

$$y_{1,1} + y_{1,5} + y_{1,6} + y_{1,8} + y_{1,9} + y_{2,3} + y_{2,10} + y_{2,14} \leq 1$$

$$y_{1,1}, y_{1,2}, y_{1,4}, y_{1,5}, y_{1,6}, y_{1,7}, y_{1,8}, y_{1,9}, y_{2,1} \in \{0,1\}$$

$$y_{2,2}, y_{2,3}, y_{2,4}, y_{2,5}, y_{2,8}, y_{2,9}, y_{2,10}, y_{2,11}, y_{2,14}, y_{2,15} \in \{0,1\}$$

THE FIRST CONSTRAINT SELECTS AT MOST ONE PROPOSAL FROM PLAYER 1;

THE SECOND CONSTRAINT SELECTS AT MOST ONE PROPOSAL FROM PLAYER 2;

THE THIRD CONSTRAINT SELECTS AT MOST ONE PROPOSAL THAT INCLUDES ITEM 3;

THE FOURTH CONSTRAINT SELECTS AT MOST ONE PROPOSAL THAT INCLUDES ITEM 4;

THE FIFTH CONSTRAINT SELECTS AT MOST ONE PROPOSAL THAT INCLUDES ITEM 5;

CONSTRAINTS FOR ITEMS 1,2,6 AND 7 ARE NOT REQUIRED IN THIS EXAMPLE, BECAUSE ONLY ONE PLAYER BIDS ON EACH OF THESE ITEMS AND SO THE ITEM CONSTRAINT IS IMPLIED BY THE PLAYER CONSTRAINT

FIG.3b (NUMERAL 36)

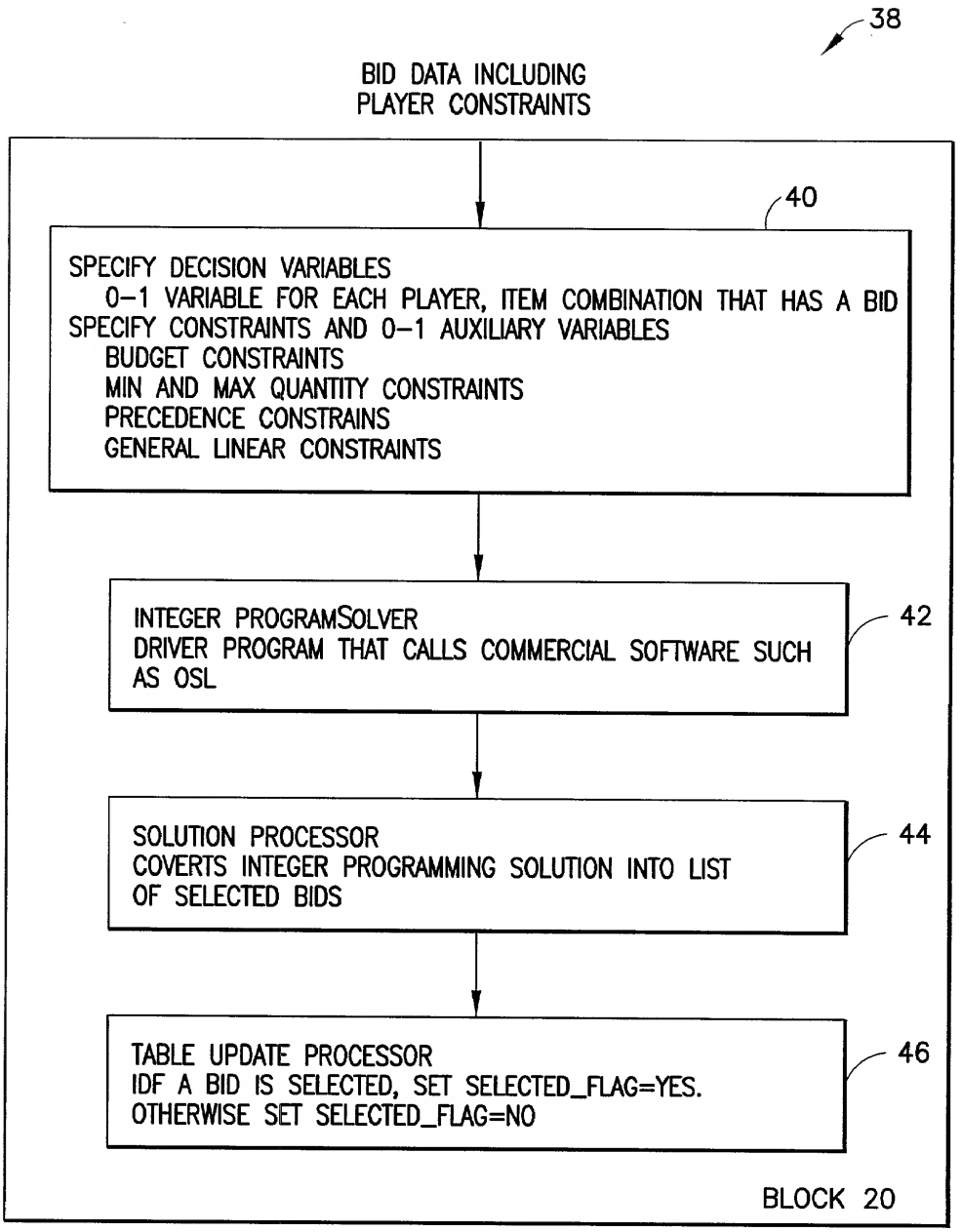
38
BID DATA INCLUDING
PLAYER CONSTRAINTS
40
SPECIFY DECISION VARIABLES
0–1 VARIABLE FOR EACH PLAYER, ITEM COMBINATION THAT HAS A BID
SPECIFY CONSTRAINTS AND 0–1 AUXILIARY VARIABLES
BUDGET CONSTRAINTS
MIN AND MAX QUANTITY CONSTRAINTS
PRECEDENCE CONSTRAINS
GENERAL LINEAR CONSTRAINTS
INTEGER PROGRAMSOLVER
DRIVER PROGRAM THAT CALLS COMMERCIAL SOFTWARE SUCH AS OSL
42
SOLUTION PROCESSOR
COVERTS INTEGER PROGRAMMING SOLUTION INTO LIST OF SELECTED BIDS
44
TABLE UPDATE PROCESSOR
IDF A BID IS SELECTED, SET SELECTED_FLAG=YES.
OTHERWISE SET SELECTED_FLAG=NO
46
BLOCK 20

FIG.4

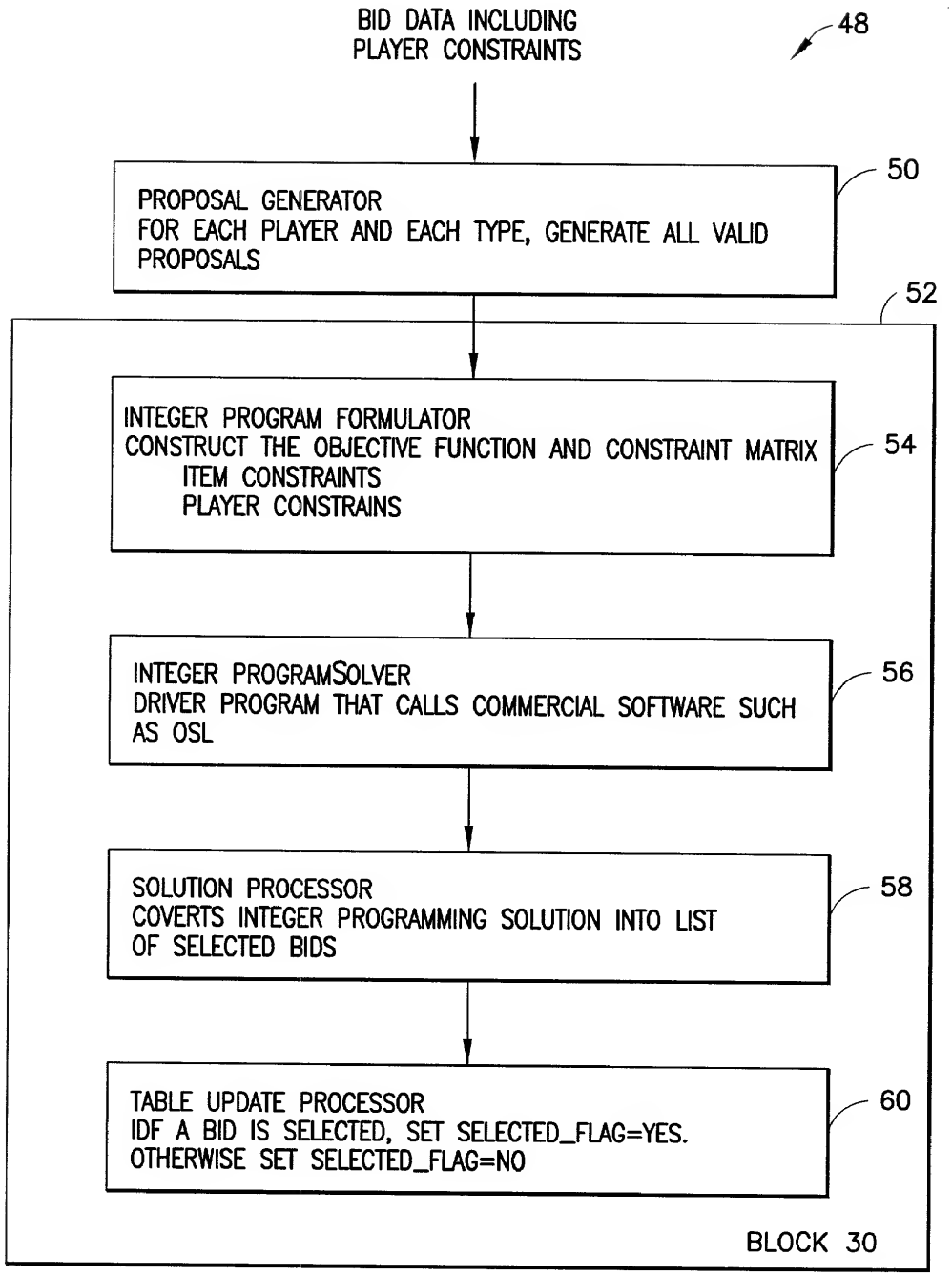
BID DATA INCLUDING
PLAYER CONSTRAINTS
48
PROPOSAL GENERATOR
FOR EACH PLAYER AND EACH TYPE, GENERATE ALL VALID PROPOSALS
50
52
INTEGER PROGRAM FORMULATOR
CONSTRUCT THE OBJECTIVE FUNCTION AND CONSTRAINT MATRIX
ITEM CONSTRAINTS
PLAYER CONSTRAINS
54
INTEGER PROGRAMSOLVER
DRIVER PROGRAM THAT CALLS COMMERCIAL SOFTWARE SUCH AS OSL
56
SOLUTION PROCESSOR
COVERTS INTEGER PROGRAMMING SOLUTION INTO LIST OF SELECTED BIDS
58
TABLE UPDATE PROCESSOR
IDF A BID IS SELECTED, SET SELECTED_FLAG=YES.
OTHERWISE SET SELECTED_FLAG=NO
60
BLOCK 30

FIG.5

PROPOSAL	ITEMS	VALUE	REJECT?
1	5	29	
2	1,3	114	
3	1,5	122	YES
4	2,4	60	
5	2,5	72	
6	4,5	46	
7	1,2,4	153	
8	1,2,5	165	
9	1,4,5	139	
10	1,2,3,5	182	YES

PLAYER 1'S PROPOSALS

PROPOSAL	ITEMS	VALUE	REJECT?
1	3	43	
2	4	29	
3	5	31	
4	6	12	
5	7	17	
6	3,4	72	YES
7	3,5	74	YES
8	3,6	55	
9	3,7	60	
10	4,5	60	
11	4,6	41	
12	5,6	43	YES
13	6,7	29	YES
14	3,4,5	104	
15	3,6,7	72	

PLAYER 2'S PROPOSALS

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FIG.6